

In the Claims:

- 1 1. [Currently Amended] A digital imaging system comprising:
2 an imaging system configured to provide image data of an image, the
3 image data comprising digital image data for a plurality of pixel locations; and
4 processing circuitry configured to process the image data provided by the
5 imaging system to denoise and sharpen the image data; wherein the processing
6 circuitry, ~~for an individual one of the pixel locations,~~ is configured to:
7 identify a ~~respective subset~~ plurality of subsets of the image data
8 corresponding to the ~~one pixel location~~ respective ones of the pixel locations;
9 and
10 perform a single processing operation using the image data of the
11 identified ~~subset~~ subsets of the image data to denoise and sharpen the image
12 data of the ~~individual one pixel location~~ pixel locations.
- 1 2. [Original] The system of claim 1 wherein the processing circuitry is
2 configured to perform the single processing operation using a robust estimation
3 filter.
- 1 3. [Original] The system of claim 1 wherein the processing circuitry is
2 configured to perform the single processing operation using a robust estimation
3 filter without division operations.
- 1 4. [Original] The system of claim 1 wherein the processing circuitry is
2 configured to perform the single processing operation using the image data
3 comprising information regarding a plurality of colors at individual ones of the
4 pixel locations.
- 1 5. [Original] The system of claim 1 wherein the processing circuitry is
2 configured to perform the single processing operation using the image data
3 comprising luminance information.

S/N: 10/632,291
PDNO. 200308995-1
Amendment B

1 6. [Original] The system of claim 1 wherein the processing circuitry is
2 configured to identify the respective subset of the image data comprising image
3 data of a plurality of other pixel locations.

1 7. [Currently Amended] A digital imaging system comprising:
2 imaging means for providing image data of an image, the image data
3 comprising digital image data for a plurality of pixel locations; and
4 processing means for denoising and sharpening the image data of the
5 pixel locations comprising for an individual one of the pixel locations:
6 identifying a respective subset of the image data comprising image
7 data of the one pixel location and image data of at least one other pixel location;
8 and
9 processing the image data of the one pixel location and the other
10 pixel location using a robust estimation filter to at least one of sharpen and
11 denoise the image data of the one pixel location; and
12 wherein the processing comprises processing using the robust
13 estimation filter comprising a bilateral filter.

1 8. [canceled].

1 9. [Currently Amended] The system of claim 7 wherein the
2 processing comprises processing using the ~~robust estimation filter comprising a~~
3 ~~bilateral filter without division operations.~~

1 10. [Original] The system of claim 7 wherein the processing comprises
2 processing the image data after demosaicing operations.

1 11. [Previously Presented] The system of claim 7 wherein the
2 processing the image data comprises processing the image data comprising
3 luminance information.

S/N: 10/632,291
PDNO. 200308995-1
Amendment B

1 12. [Currently Amended] An article of manufacture comprising:
2 a processor-usable medium comprising processor-usable code configured
3 to cause processing circuitry to perform processing comprising:
4 ~~access~~ accessing image data for a plurality of pixel locations of an
5 image, wherein the image data comprises color information for a plurality of
6 colors for individual ones of the pixel locations;
7 ~~identify~~ identifying one pixel location;
8 ~~identify~~ identifying a plurality of other pixel locations responsive to
9 the identification of the one pixel location; ~~and~~
10 ~~apply~~ applying a robust estimation filter to the image data of the
11 one pixel location and the other pixel locations to at least one of sharpen and
12 denoise the image data of the one pixel location; and
13 demosaicing the image data, and wherein the applying comprises
14 applying after the demosaicing.

1 13. [Original] The article of claim 12 wherein the code is configured to
2 cause the processing circuitry to apply the robust estimation filter comprising a
3 bilateral filter.

1 14. [Original] The article of claim 12 wherein the code is configured to
2 cause the processing circuitry to apply the robust estimation filter comprising a
3 bilateral filter without division operations.

1 15. [canceled].

1 16. [Original] The article of claim 12 wherein the image data
2 comprises chrominance information and luminance information and the code is
3 configured to cause the processing circuitry to apply the robust estimation filter
4 to the luminance information of the image data.

S/N: 10/632,291
PDNO. 200308995-1
Amendment B

1 17. [Currently Amended] A digital image processing method
2 comprising:

3 ~~providing~~ accessing image data of an image, the image data comprising
4 digital image data for a plurality of pixel locations; and
5 processing the image data comprising sharpening and denoising the image
6 data using a robust estimation filter.

1 18. [Original] The method of claim 17 wherein the robust estimation
2 filter comprises a bilateral filter.

1 19. [Original] The method of claim 17 wherein the robust estimation
2 filter comprises a bilateral filter without division operations.

1 20. [Original] The method of claim 17 wherein the processing
2 comprises processing in a single processing operation.

1 21. [Original] The method of claim 17 further comprising demosaicing
2 the image data, and the processing comprises processing after the demosaicing.

1 22. [Original] The method of claim 17 wherein the providing image
2 data comprises providing image data comprising a plurality of colors for
3 individual ones of the pixels.

1 23. [Original] The method of claim 17 wherein the image data
2 comprises chrominance and luminance information, and wherein the sharpening
3 and denoising comprise sharpening and denoising only the luminance
4 information.

1 24. [Original] The method of claim 17 wherein the processing
2 comprises adjusting image data of one of the pixel locations using image data of
3 at least one other pixel location.

S/N: 10/632,291
PDNO. 200308995-1
Amendment B

1 25. [Previously Presented] The method of claim 24 wherein the
2 adjusting comprises adjusting to denoise the image data responsive to a
3 difference of the image data of the one and the other pixel locations being less
4 than a threshold and adjusting to sharpen the image data responsive to the
5 difference of the image data being greater than the threshold.

1 26. [Original] The method of claim 25 wherein the adjusting to
2 sharpen the image data comprises adjusting responsive to a difference of the
3 image data being less than another threshold.

1 27. [Original] The method of claim 24 further comprising applying
2 square root operations to the image data of the one pixel location and the image
3 data of the other pixel location before the adjusting.

1 28. [Currently Amended] The system of claim 1 wherein the
2 processing circuitry is configured to perform the single processing operation
3 using the image data of the identified ~~subset~~ subsets of the image data after
4 demosaicing of the image data.

1 29. [Previously Presented] The system of claim 7 wherein the
2 processing means comprises means for comparing the image data of the one
3 pixel location with the image data of the other pixel location and to select the at
4 least one of the sharpening and denoising responsive to the comparison.

1 30. [Previously Presented] The article of claim 12 wherein the code is
2 configured to cause the processing circuitry to compare the image data of the
3 one pixel location and the image data of at least one of the other pixel locations,
4 and to select the at least one of the sharpening and the denoising responsive to
5 the comparison.

1 31. [Previously Presented] The method of claim 17 further comprising:
2 for an individual one pixel location, comparing image data of the individual
3 one pixel location with image data of an other of the pixel locations;

*S/N: 10/632,291
PDNO. 200308995-1
Amendment B*

4 selecting, for the individual one pixel location, one of the sharpening and
5 denoising responsive to the comparing; and
6 wherein the processing comprises performing the selected one of the
7 sharpening and denoising of the image data of the individual one pixel location
8 responsive to the selecting.

1 32. [New] A digital imaging system comprising:
2 imaging means for providing image data of an image, the image data
3 comprising digital image data for a plurality of pixel locations; and
4 processing means for denoising and sharpening the image data of the
5 pixel locations comprising for an individual one of the pixel locations:
6 identifying a respective subset of the image data comprising image
7 data of the one pixel location and image data of at least one other pixel location;
8 and
9 processing the image data of the one pixel location and the other
10 pixel location using a robust estimation filter to at least one of sharpen and
11 denoise the image data of the one pixel location; and
12 wherein the processing comprises processing the image data after
13 demosaicing operations.

1 33. [New] An article of manufacture comprising:
2 a processor-usable medium comprising processor-usable code configured
3 to cause processing circuitry to perform processing comprising:
4 accessing image data for a plurality of pixel locations of an image,
5 wherein the image data comprises color information for a plurality of colors for
6 individual ones of the pixel locations;
7 identifying one pixel location;
8 identifying a plurality of other pixel locations responsive to the
9 identification of the one pixel location; and
10 applying a robust estimation filter comprising a bilateral filter to the
11 image data of the one pixel location and the other pixel locations to at least one
12 of sharpen and denoise the image data of the one pixel location.

S/N: 10/632,291
PDNO. 200308995-1
Amendment B

1 34. [New] The article of claim 33 wherein the code is configured to
2 cause the processing circuitry to apply the robust estimation filter comprising a
3 bilateral filter without division operations.

1 35. [New] The system of claim 1 wherein the processing circuitry is
2 configured to use a single equation to perform the single processing operation to
3 denoise and sharpen the image data.

1 36. [New] The system of claim 1 wherein the processing circuitry is
2 configured to determine contrast information for individual ones of the individual
3 pixel locations and to perform the single processing operation to one of denoise
4 and sharpen the image data of the individual pixel locations responsive to the
5 determined contrast information.

1 37. [New] The system of claim 1 wherein the processing circuitry is
2 configured to perform the single processing operation a plurality times for
3 different colors of the image data of an individual one of the pixel locations.

1 38. [New] The method of claim 17 wherein the processing comprises
2 executing the robust estimation filter a plurality of times for respective ones of a
3 plurality of colors for an individual one of the pixel locations.

1 39. [New] The method of claim 17 wherein the processing comprises
2 determining contrast information for individual ones of the pixel locations, and
3 selecting one of the sharpening and the denoising the image data for the
4 individual pixel locations using the respective contrast information for the
5 individual pixel locations.

S/N: 10/632,291
PDNO. 200308995-1
Amendment B